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Dale Hollow Reservoir, Clinton and Cumberland Counties, Kentucky and Clay, Overton, and Pickett Counties, Tennessee

National Eutrophication Survey, Corvallis, Oreg

Prepared for

Corvallis Environmental Research Lab, Oreg

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NATIONAL EUTROPHICATION SURVEY

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16. ABSTRACT

Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

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REPORT

ON

DALE HOLLOW RESERVOIR

CLINTON AND CUMBERLAND COUNTIES, KENTUCKY

AND

CLAY, OVERTON, AND PICKETT, COUNTIES, TENNESSEE

EPA REGION IV

WORKING PAPER No. 352

WITH THE COOPERATION OF THE

KENTUCKY DEPARTMENT FOR NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

AND THE

KENTUCKY NATIONAL GUARD

JUNE, 1977

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FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to freshwater lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGEMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the Kentucky Department for Natural Resources and Environmental Protection for professional involvement, to the Kentucky National Guard for conducting the tributary sampling phase of the Survey, and to those Kentucky wastewater treatment plant operators who voluntarily provided effluent samples.

Harold Snodgrass, former Director, and Mercer M. Peters of the Division of Water Quality provided invaluable lake documentation and counsel during the Survey; and the staff of the Division reviewed the preliminary reports and provided critiques most useful in the preparation of this Working Paper series.

Major General Richard L. Frymire, the Adjutant General of Kentucky, and Project Officers Lt. Colonel Thomas Buyher, Jr., and Lt. Colonel David B. May, who directed the volunteer efforts of the Kentucky National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY
STUDY RESERVOIRS
STATE OF KENTUCKY

NAME	COUNTY
Barkley	Lyon, Trigg, KY; Cheatham, Montgomery, Stewart, TN
Barren River	Allen, Barren
Cumberland	Clinton, Pulaski, Russell, Wayne
Dale Hollow	Clinton, Cumberland, KY; Clay, Overton, Pickett, TN
Herrington	Boyler, Garrard, Mercer
Kentucky	Calloway, Livingston, Lyon, Marshall, Trigg, KY; Benton, Decatur, Henry, Houston, Humphreys, Perry, Stewart, TN

Cumberland River
Ky.
Tenn.
Map Location
36°45'
Albany
C1
B1
A1
KENTUCKY
TENNESSEE
DALE HOLLOW RESERVOIR
D1
Obey River
36°30'
J1
Big Eagle Creek
Jamestown
G1
F1
E1
H1
Big Indian Cr.
West Fork Obey River
East Fork Obey R.
36°15'
Monterey
Mayland Lake
DALE HOLLOW RESERVOIR
Tributary Sampling Site
Lake Sampling Site
Drainage Area Boundary
Sewage Treatment Facility
0 5 10 15 20 Km.
0 5 10 MI.
Scale
85°30'
85°15'
85°00'

DALE HOLLOW RESERVOIR

STORET NO. 2102

I. CONCLUSIONS

A. Trophic Condition:

Survey data indicate Dale Hollow Reservoir is oligo-mesotrophic; i.e., low to moderate supplies of nutrients and low to moderate productivity. Whether nutrient enrichment is beneficial or deleterious depends on the actual or potential effect on the uses of the reservoir. In this regard, personnel of the Kentucky Department for Natural Resources and Environmental Protection have indicated there is no known impairment of the beneficial uses of Dale Hollow Reservoir.

This water body ranked first in overall trophic quality when the five Kentucky reservoirs sampled in 1973 were compared using a combination of six parameters*. None of the other reservoirs had less median total phosphorus, dissolved phosphorus, and inorganic nitrogen. None of the others had less mean chlorophyll a, and none had greater mean Secchi disc transparency. Marked depression of dissolved oxygen with depth occurred at all sampling stations in August and at stations 1, 2, 3, and 5 in October.

Survey limnologists reported some higher aquatic plants present in the shallow areas, but otherwise no visible phyto-

* See Appendix A.

plankton or other nuisance conditions were noted. The water was described as "very clear".

In a summary report (Anonymous, 1976), it is concluded that this is an oligotrophic reservoir of outstandingly high water quality which supports a fine sports fishery.

B. Rate-Limiting Nutrient:

The algal assay results indicate the reservoir was phosphorus limited at the times the samples were collected (05/18-19/73). The reservoir data also indicate phosphorus limitation; at all sampling times, the mean inorganic nitrogen to orthophosphorus ratios were 37 to 1 or greater.

C. Nutrient Controllability:

1. Point sources--The phosphorus contribution of the listed point sources amounted to 36.5% of the total input to Dale Hollow Reservoir during the sampling year. The Albany, Kentucky sewage treatment facility supplied 30.9%, and the Jamestown, Tennessee plant contributed an estimated 5.6% of the total. The phosphorus loading of 0.35 $g/m^2/yr$ measured during the sampling year is almost equal to that proposed by Vollenweider (Vollenweider & Dillon, 1974) as an oligotrophic loading (see page 15). For this reason, all phosphorus inputs should be minimized to the greatest possible extent to maintain the present high water quality of Dale Hollow Reservoir.

2. Non-point sources--The phosphorus load from non-point

sources accounted for almost 64% of the total. The Wolf River contributed 26.4%; Spring Creek, 8.6%; the East Fork of the Obey River, 7.5%; the West Fork of the Obey River, 6.5%; and the five remaining listed tributaries collectively contributed 6.6% of the total. The ungaged tributaries contributed an estimated 3.0% of the total.

The phosphorus export rate of Spring Creek was appreciably higher than the rates of the other tributaries (see page 14). This may have resulted from underestimation of the contribution of the Albany wastewater treatment facility or differing land-use practices in that drainage.

Overall, the phosphorus exports rates of the reservoir tributaries were relatively low (mean of 9.1 kg/km^2/yr) and compare very well with the export rates of the 19 sampled tributaries of nearby Cumberland Lake* (mean of 17.7 kg/km^2/yr; range of 4 - 38 kg/km^2/yr).

* Working Paper No. 351.

II. RESERVOIR AND DRAINAGE BASIN CHARACTERISTICS†

A. Morphometry††:

1. Surface area: 108.62 kilometers^2.
2. Mean depth: 14.4 meters.
3. Maximum depth: >36 meters.
4. Volume: 1,569.000 x 10^6 m^3.
5. Mean hydraulic retention time: 1.2 years.

B. Tributary and Outlet:
(See Appendix C for flow data)

1. Tributaries -

Name	Drainage area (km^2)*	Mean flow (m^3/sec)*
Spring Creek	154.6	2.74
Sulphur Creek	22.4	0.41
Illwill Creek	133.4	2.43
Wolf River	751.1	13.71
East Fork, Obey River	523.2	10.90
Big Indian Creek	35.0	0.73
Poplar Cove Creek	48.7	0.95
West Fork, Obey River	388.5	5.86
Big Eagle Creek	117.6	1.74
Minor tributaries & immediate drainage -	141.1	3.16
Totals	2,315.6	42.63**

2. Outlet -

Obey River	2,424.2***	42.63

C. Precipitation****:

1. Year of sampling: 188.2 centimeters.
2. Mean annual: 138.2 centimeters.

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† Table of metric conversions--Appendix B.
†† At mean elevation of 197.5 m (Moore, 1977).
* For limits of accuracy, see Working Paper No. 175, "...Survey Methods, 1973-1976".
** Sum of inflows adjusted to equal outflow.
*** Includes area of reservoir.
**** See Working Paper No. 175.

III. WATER QUALITY SUMMARY

Dale Hollow Reservoir was sampled three times in 1973 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from a number of depths at six stations on the reservoir (see map, page v). During each visit, a single depth-integrated (4.6 m to surface) sample was composited from the stations for phytoplankton identification and enumeration; and during the first visit, two 18.9-liter depth-integrated samples were composited for algal assays. Also each time, a depth-integrated sample was collected from each of the stations for chlorophyll a analysis. The maximum depths sampled were 34.1 meters at station 1, 36.0 meters at station 2, 29.9 meters at station 3, 17.1 meters at station 4, 21.6 meters at station 5, and 12.2 meters at station 6.

The sampling results are presented in full in Appendix D and are summarized in the following table.

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR DALE HOLLOW RESERVOIR
STORET CODE 2102

PARAMETER	1ST SAMPLING (5/18/73) 6 SITES RANGE	MEAN	MEDIAN	2ND SAMPLING (8/18/73) 6 SITES RANGE	MEAN	MEDIAN	3RD SAMPLING (10/24/73) 6 SITES RANGE	MEAN	MEDIAN
TEMP (C)	10.1 - 18.9	15.6	15.9	10.5 - 29.7	22.3	23.1	11.0 - 21.8	19.2	20.7
DISS OXY (MG/L)	4.8 - 10.4	8.8	9.1	0.2 - 10.6	4.8	4.8	0.6 - 8.0	5.0	6.5
CNDCTVY (MCROMO)	****** -**********			124. - 270.	172.	183.	132. - 290.	174.	169.
PH (STAND UNITS)	7.5 - 8.1	7.8	7.8	6.2 - 7.8	6.9	6.8	7.0 - 7.9	7.4	7.5
TOT ALK (MG/L)	36. - 85.	61.	62.	52. - 97.	67.	64.	50. - 98.	66.	64.
TOT P (MG/L)	0.005 - 0.048	0.012	0.010	0.009 - 0.030	0.014	0.013	0.004 - 0.022	0.009	0.008
ORTHO P (MG/L)	0.002 - 0.010	0.003	0.002	0.003 - 0.016	0.008	0.007	0.003 - 0.010	0.005	0.005
NO2+NO3 (MG/L)	0.190 - 0.380	0.271	0.280	0.040 - 0.460	0.211	0.195	0.020 - 0.310	0.077	0.050
AMMONIA (MG/L)	0.020 - 0.060	0.035	0.030	0.030 - 0.280	0.081	0.055	0.030 - 0.740	0.115	0.060
KJEL N (MG/L)	0.200 - 0.400	0.250	0.200	0.200 - 0.700	0.384	0.400	0.200 - 0.900	0.285	0.200
INORG N (MG/L)	0.210 - 0.420	0.306	0.300	0.070 - 0.560	0.292	0.305	0.070 - 0.770	0.192	0.115
TOTAL N (MG/L)	0.390 - 0.710	0.521	0.505	0.360 - 0.830	0.595	0.570	0.220 - 1.100	0.362	0.260
CHLRPYL A (UG/L)	0.6 - 8.4	2.9	1.0	2.5 - 13.2	6.4	5.5	0.6 - 2.2	1.4	1.4
SECCHI (METERS)	1.5 - 11.0	6.4	5.9	1.1 - 5.7	3.2	3.2	1.7 - 5.8	3.4	3.1

B. Biological Characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal Units per ml
05/18-19/73	1. Flagellates	112
	2. Dinobryon sp.	73
	3. Asterionella sp.	15
	4. Cyclotella sp.	10
	5. Fragilaria sp.	5
	Other genera	66
	Total	281
08/18/73	1. Anomoeoneis sp.	817
	2. Cyclotella sp.	83
	3. Flagellates	71
	4. Dinoflagellates	71
	5. Asterionella sp.	59
	Other genera	189
	Total	1,290
10/24/73	1. Flagellates	447
	2. Synedra sp.	49
	3. Anomoeoneis sp.	49
	4. Spherical cells	49
	5. Achnanthes sp.	26
	Other genera	38
	Total	658

2. Chlorophyll a -

Sampling Date	Station Number	Chlorophyll a (µg/l)
05/18-19/73	1	0.7
	2	0.6
	3	0.8
	4	1.2
	5	5.9
	6	8.4

Sampling Date	Station Number	Chlorophyll a (µg/l)
08/18/73	1	3.3
	2	2.5
	3	2.6
	4	9.1
	5	7.7
	6	13.2
10/24/73	1	1.5
	2	1.4
	3	0.9
	4	2.1
	5	0.6
	6	2.2

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

a. Stations 1, 2, and 3 -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.016	0.256	0.1
0.050 P	0.066	0.256	6.3
0.050 P + 1.0 N	0.066	1.256	18.8
1.0 N	0.016	1.256	0.1

b. Stations 4, 5, and 6 -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.004	0.294	0.1
0.050 P	0.054	0.294	3.4
0.050 P + 1.0 N	0.054	1.294	10.0
1.0 N	0.004	1.294	0.1

2. Discussion -

The control yields of the assay alga, Selenastrum capricornutum, indicate that the potential primary productivity

of Dale Hollow Reservoir was low at the times the assay samples were collected (05/18-19/73). Also, the increased yields when phosphorus alone was added indicate phosphorus limitation. Note that the addition of nitrogen alone did not result in increased yields.

The reservoir data indicate phosphorus limitation at all sampling times. The mean inorganic nitrogen to orthophosphorus ratios were 37 to 1 or greater at all sampling times, and phosphorus limitation would be expected.

IV. NUTRIENT LOADINGS
(See Appendix E for data)

For the determination of nutrient loadings, the Kentucky and Tennessee National Guards collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page v), except for the months of January and February when two samples were collected at many of the sites. Sampling was begun in April, 1973, and was completed in March, 1974.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the Kentucky District Office of the U.S. Geological Survey for the tributary sites nearest the lake.

In this report, nutrient loads for sampled tributaries were determined by using a modification of a U.S. Geological Survey computer program for calculating stream loadings*. Nutrient loads shown are those measured minus point-source loads, if any.

Nutrient loads for unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated using the means of the nutrient exports, in kg/km^2/year, at stations B-1, C-1, D-1, F-1, G-1, H-1, and J-1 and multiplying the means by the ZZ area in km^2.

The operator of the Albany, Kentucky wastewater treatment plant provided monthly effluent samples and corresponding flow data. The operator of Jamestown, Tennessee wastewater treatment plant did not participate in the sampling program, and nutrient loads were estimated at 1.134 kg P and 3.401 kg N/capita/year.

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* See Working Paper No. 175.

A. Waste Sources:

1. Known municipal -

Name	Pop. Served	Treatment	Mean Flow (m^3/d)	Receiving Water
Albany, KY	2,500†	Imhoff tank	1,288.0	Cedar Fk./ Spring Cr.
Jamestown, TN	1,898*	Imhoff tank	718.4**	Rock Castle Cr./ E. Fk., Obey R.

2. Known industrial - None

† Treatment plant questionnaire.
* 1970 Census.
** Estimated at 0.3785 m^3/capita/day.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source		kg P/ yr	% of total
a.	Tributaries (non-point load) -		
	Spring Creek	3,290	8.6
	Sulphur Creek	195	0.5
	Illwill Creek	825	2.2
	Wolf River	10,100	26.4
	East Fork, Obey River	2,850	7.5
	Big Indian Creek	280	0.7
	Poplar Cove Creek	340	0.9
	West Fork, Obey River	2,465	6.5
	Big Eagle Creek	870	2.3
b.	Minor tributaries & immediate drainage (non-point load) -	1,130	3.0
c.	Known municipal STP's -		
	Albany, KY	11,790	30.9
	Jamestown, TN	2,150	5.6
d.	Septic tanks* -	10	<0.1
e.	Known industrial - None	-	-
f.	Direct precipitation** -	1,900	5.0
	Total	38,195	100.0

2. Outputs -

Reservoir outlet - Obey River 13,085

3. Net annual P accumulation - 25,110 kg.

* Estimate based on 29 shoreline dwellings; see Working Paper No. 175.
** See Working Paper No. 175.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/yr	% of total
a. Tributaries (non-point load) -		
Spring Creek	102,165	7.8
Sulphur Creek	11,375	0.9
Illwill Creek	103,185	7.9
Wolf River	330,745	25.3
East Fork, Obey River	297,695	22.8
Big Indian Creek	15,155	1.2
Poplar Cove Creek	36,215	2.8
West Fork, Obey River	125,850	9.6
Big Eagle Creek	65,505	5.0
b. Minor tributaries & immediate drainage (non-point load) -	76,195	5.8
c. Known municipal STP's -		
Albany, KY	18,660	1.4
Jamestown, TN	6,455	0.5
d. Septic tanks* -	310	<0.1
e. Known industrial - None	-	-
f. Direct precipitation** -	117,265	9.0
Total	1,306,775	100.0

2. Outputs -

Reservoir outlet - Obey River 2,585,010

3. Net annual N loss - 1,278,235 kg.

* Estimate based on 29 shoreline dwellings; see Working Paper No. 175.
** See Working Paper No. 175.

D. Non-point Nutrient Export by Subdrainage Area:

Tributary	kg P/km²/yr	kg N/km²/yr
Spring Creek	21	661
Sulphur Creek	9	508
Illwill Creek	6	774
Wolf River	13	440
East Fork, Obey River	5	569
Big Indian Creek	8	433
Poplar Cove Creek	7	744
West Fork, Obey River	6	324
Big Eagle Creek	7	557

E. Yearly Loads:

In the following table, the existing phosphorus loadings are compared to those proposed by Vollenweider (Vollenweider and Dillon, 1974). Essentially, his "dangerous" loading is one at which the receiving water would become eutrophic or remain eutrophic; his "permissible" loading is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic loading would be considered one between "dangerous" and "permissible".

Note that Vollenweider's model may not be applicable to water bodies with short hydraulic retention times.

	Total Phosphorus		Total Nitrogen	
	Total	Accumulated	Total	Accumulated
grams/m^2/yr	0.35	0.23	12.0	loss*

Vollenweider phosphorus loadings ($g/m^2/yr$) based on mean depth and mean hydraulic retention time of Dale Hollow Reservoir:

"Dangerous" (eutrophic loading)	0.68
"Permissible" (oligotrophic loading)	0.34

* There was an apparent loss of nitrogen during the sampling year. This may have been due to nitrogen fixation in the lake, solubilization of previously sedimented nitrogen, recharge with nitrogen-rich ground water, or unknown and unsampled point sources discharging directly to the lake. Whatever the cause, a similar nitrogen loss has occurred at Shagawa Lake, Minnesota, which has been intensively studied by EPA's former National Eutrophication and Lake Restoration Branch (Malueg et al., 1975).

V. LITERATURE REVIEWED

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Moore, E. C., 1977. Personal communication (reservoir morphometry). Engr. Divn., Nashville Distr., U.S. Corps of Engineers, Nashville, TN.

Vollenweider, R. A., and P. J. Dillon, 1974. The application of the phosphorus loading concept to eutrophication research. Natl. Res. Council of Canada Publ. No. 13690, Canada Centre for Inland Waters, Burlington, Ontario.

VI. APPENDICES

APPENDIX A

LAKE RANKINGS

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS P
2101	LAKE CUMBERLAND-	0.015	0.330	432.381	3.805	14.900	0.007
2102	DALE HOLLOW RESERVOIR	0.010	0.270	330.000	3.594	14.800	0.005
2103	HERRINGTON LAKE	0.079	0.550	442.667	14.908	14.900	0.047
2104	KENTUCKY LAKE	0.072	0.520	461.972	9.089	12.600	0.030
2105	BARKEN RIVER RESERVOIR	0.027	0.460	452.594	8.216	14.900	0.006

PERCENT OF LAKES WITH HIGHER VALUES

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS P	IN NO
2101	LAKE CUMBERLAND	60 (3)	60 (3)	60 (3)	60 (3)	20 (0)	40 (2)	3(
2102	DALE HOLLOW RESERVOIR	80 (4)	80 (4)	80 (4)	80 (4)	60 (3)	80 (4)	4(
2103	HERRINGTON LAKE	0 (0)	0 (0)	40 (2)	0 (0)	20 (0)	0 (0)	
2104	KENTUCKY LAKE	20 (1)	20 (1)	0 (0)	20 (1)	80 (4)	20 (1)	1(
2105	BARKEN RIVER RESERVOIR	40 (2)	40 (2)	20 (1)	40 (2)	20 (0)	60 (3)	2(

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	2102	DALE HOLLOW RESERVOIR	460
2	2101	LAKE CUMBERLAND	300
3	2105	BARREN RIVER RESERVOIR	220
4	2104	KENTUCKY LAKE	160
5	2103	HERRINGTON LAKE	60

APPENDIX B

CONVERSION FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX C

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR KENTUCKY 2/3/75

LAKE CODE 2102 DALE HOLLOW RESERVOIR

TOTAL DRAINAGE AREA OF LAKE(SQ KM) 2424.2

TRIBUTARY	SUB-DRAINAGE AREA(SQ KM)	NORMALIZED FLOWS(CMS) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
2102A1	154.6	5.66	6.80	6.63	4.08	2.16	1.54	0.10	0.39	0.46	0.37	1.52	3.43	2.74
2102B1	22.4	0.82	0.99	0.96	0.59	0.31	0.22	0.15	0.06	0.07	0.05	0.22	0.50	0.41
2102C1	133.4	4.90	5.86	5.72	3.54	1.87	1.33	0.90	0.33	0.39	0.32	1.31	2.94	2.43
2102D1	751.1	27.52	33.13	32.28	19.88	10.51	7.48	5.10	1.89	2.22	1.81	7.39	16.59	13.71
2102E1	523.2	21.86	26.14	25.17	16.00	9.32	4.70	3.62	1.80	1.87	1.63	6.14	13.54	10.90
2102F1	35.0	1.46	1.75	1.68	1.07	0.62	0.31	0.24	0.12	0.13	0.11	0.41	0.91	0.73
2102G1	48.7	1.91	2.29	2.21	1.39	0.78	0.46	0.33	0.14	0.16	0.13	0.52	1.17	0.95
2102H1	388.5	12.01	14.67	14.27	8.61	4.47	2.51	1.91	0.98	0.93	0.72	2.97	6.85	5.86
2102J1	117.6	3.34	4.02	4.16	2.64	1.38	0.96	0.82	0.45	0.40	0.27	0.76	1.85	1.74
2102K1	2424.2	48.94	50.40	63.15	67.96	46.44	39.64	37.38	41.63	32.56	25.29	23.84	34.83	42.63
2102ZZ	145.0	5.66	6.82	6.60	4.13	2.32	1.36	0.98	0.43	0.48	0.40	1.55	3.48	2.83

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 2424.2
SUM OF SUB-DRAINAGE AREAS = 2319.5

TOTAL FLOW IN = 511.55
TOTAL FLOW OUT = 512.11

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
2102A1	4	73	4.02	1	3.88	29	6.51		
	5	73	6.74						
	6	73	3.43	17	4.02				
	7	73	2.62	22	0.51				
	8	73	0.49	19	0.30				
	9	73	0.17	16	0.15				
	10	73	0.10	14	0.10				
	11	73	4.87	18	0.34				
	12	73	5.38						
	1	74	12.60	5	9.23	20	2.28		
	2	74	5.41	2	14.64	17	2.59		
	3	74	5.95	17	3.51				
2102B1	4	73	0.58	1	0.56	29	0.93		
	5	73	0.97						
	6	73	0.50	17	0.58				
	7	73	0.38	22	0.07				
	8	73	0.07	19	0.05				
	9	73	0.03	16	0.02				
	10	73	0.01	14	0.01				
	11	73	0.71	18	0.05				
	12	73	0.78						
	1	74	1.83	5	1.34	20	0.32		
	2	74	0.78	2	2.12	17	0.37		
	3	74	0.86	17	0.51				

TRIBUTARY FLOW INFORMATION FOR KENTUCKY 2/3/75

LAKE CODE 2102 DALE HOLLOW RESERVOIR

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
2102C1	4	73	5.15	1	3.34				
	5	73	5.80						
	6	73	2.94	17	3.48				
	7	73	2.26	22	0.44				
	8	73	0.42	19	0.26				
	9	73	0.15	16	0.13				
	10	73	0.09	14	0.09				
	11	73	4.19	18	0.29				
	12	73	4.64						
	1	74	10.87	5	7.96				
	2	74	4.67	2	12.63	17	2.23		
	3	74	5.13	17	3.03				
2102D1	4	73	22.60	14	15.12				
	5	73	33.70	8	22.34				
	6	73	18.32	1	16.17				
	7	73	16.42	11	18.55				
	8	73	3.37	15	2.94				
	9	73	0.82	13	0.82				
	10	73	1.07	18	0.82				
	11	73	32.00	16	1.56				
	12	73	30.02	20	10.42				
	1	74	69.66	16	22.51				
	2	74	29.17	6	37.66	20	18.49		
	3	74	35.68	20	124.88				
2102E1	4	73	28.74	14	17.22				
	5	73	56.07	8	19.51				
	6	73	15.35	1	22.03				
	7	73	12.15	11	5.52				
	8	73	3.28	15	2.97				
	9	73	0.74	13	0.67				
	10	73	6.71	18	0.52				
	11	73	28.29	16	1.42				
	12	73	33.98	20	17.36				
	1	74	73.62	16	27.04				
	2	74	36.81	6	41.06	20	25.68		
	3	74	35.11	20	131.11				
2102F1	4	73	1.48	14	0.88				
	5	73	2.89	8	1.00				
	6	73	0.79	1	1.13				
	7	73	0.62	11	0.28				
	8	73	0.17	15	0.15				
	9	73	0.04	13	0.03				
	10	73	0.03	18	0.03				
	11	73	1.45	16	0.07				
	12	73	1.75	20	0.89				
	1	74	3.79	16	1.39				
	2	74	1.89	6	2.10	20	1.32		
	3	74	1.80	20	6.74				

TRIBUTARY FLOW INFORMATION FOR KENTUCKY 2/3/75

LAKE CODE 2102 DALE HOLLOW RESERVOIR

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
2102G1	4	73	1.76	14	1.11				
	5	73	3.09	8	1.42				
	6	73	1.14	1	1.31				
	7	73	0.97	11	0.80				
	8	73	0.22	15	0.20				
	9	73	0.05	13	0.05				
	10	73	0.06	18	0.04				
	11	73	2.04	16	0.10				
	12	73	2.19	20	0.96				
	1	74	4.90	16	1.69				
	2	74	2.25	6	2.69	20	1.52		
	3	74	2.42	20	8.72				
2102H1	4	73	14.02	14	8.83				
	5	73	24.64	8	11.33				
	6	73	9.09	1	10.45				
	7	73	7.70	11	6.37				
	8	73	1.78	15	1.61				
	9	73	0.42	13	0.38				
	10	73	0.47	18	0.34				
	11	73	16.31	16	0.81				
	12	73	17.50	20	7.65				
	1	74	39.08	16	13.51				
	2	74	18.01	6	21.46	20	12.12		
	3	74	19.28	20	69.66				
2102J1	4	73	3.37	14	2.30				
	5	73	9.66	8	3.37				
	6	73	2.65	1	3.79				
	7	73	2.10	11	0.95				
	8	73	0.57	15	0.52				
	9	73	0.13	13	0.12				
	10	73	0.12	18	0.09				
	11	73	4.90	16	0.24				
	12	73	5.89	20	3.00				
	1	74	12.71	16	4.67				
	2	74	6.34	6	7.08	20	4.45		
	3	74	6.06	20	19.54				
2102K1	3	73	70.79	31	153.48				
	4	73	108.17	29	30.30				
	5	73	73.91						
	6	73	96.56	11	106.47				
	7	73	73.06	22	79.94				
	8	73	64.28	19	22.34				
	9	73	29.02	3	41.71				
	10	73	30.58	15	27.44				
	11	73	15.66	8	0.51				
	12	73	61.16	9	55.78				
	1	74	124.31	6	85.52				
	2	74	118.93	17	87.22				
	3	74	99.11	17	119.78				

TRIBUTARY FLOW INFORMATION FOR KENTUCKY

2/3/75

LAKE CODE 2102 DALE HOLLOW RESERVOIR

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
210222	4	73	5.24	2					
	5	73	9.20	18					
	6	73	3.40	25					
	7	73	2.89	11					
	8	73	0.67						
	9	73	0.16	25					
	10	73	0.18	31					
	11	73	6.12	25					
	12	73	6.51	9					
	1	74	14.55	16					
	2	74	6.71	25					
	3	74	7.19	19					

APPENDIX D

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 75/01/27

210201
36 32 23.0 085 26 49.0
DALE HOLLOW RESERVOIR
21 KENTUCKY

11EPALES
3

2111202
0104 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/05/18	09 50	0000	17.9		432	198	7.90	65	0.040	0.400	0.190	0.005
	09 50	0006	17.9	9.4		188	8.00	65	0.020	0.200	0.190	0.005
	09 50	0015	17.9	9.8		188	8.10	63	0.030	0.200	0.190	0.003
	09 50	0035	15.8	10.4		192	8.00	63	0.030	0.300	0.200	0.010
	09 50	0050	12.8	10.3		193	8.00	61	0.030	0.200	0.240	0.003
	09 50	0075	11.9	9.6		190	7.90	63	0.030	0.200	0.260	0.005
	09 50	0100	11.0	9.1		190	7.80	63	0.030	0.200K	0.290	0.005
73/08/18	13 50	0000	28.3		144	181	7.50	61	0.070	0.600	0.080	0.008
	13 50	0005	28.2	8.6		185	7.40	60	0.050	0.300	0.060	0.011
	13 50	0025	26.4	10.6		180	7.10	60	0.050	0.300	0.150	0.010
	13 50	0040	20.8	9.2		160	6.90	61	0.060	0.300	0.220	0.007
	13 50	0055	17.5	6.2		135	6.60	54	0.060	0.300	0.270	0.013
	13 50	0070	14.8	4.8		127	6.50	55	0.040	0.200	0.350	0.010
	13 50	0085	13.0	4.0		132	6.30	61	0.040	0.300	0.360	0.010
	13 50	0100	11.7	2.0		142	6.30	64	0.050	0.200	0.360	0.009
	13 50	0112	10.5	1.6		148	6.20	66	0.040	0.200	0.340	0.009
73/10/24	19 25	0000	21.6		180	160	7.90	59	0.050	0.200K	0.060	0.004
	19 25	0010	21.5	7.8		160	7.90	62	0.040	0.200	0.050	0.009
	19 25	0035	21.4	7.9		160	7.80	62	0.040	0.200K	0.050	0.004
	19 25	0045	21.4	7.4		160	7.60	61	0.040	0.200K	0.050	0.004
	19 25	0050	19.2	3.0		143	7.20	57	0.060	0.200K	0.290	0.006
	19 25	0080	14.	1.0		132	7.10	62	0.040	0.800	0.300	0.007
	19 25	0111	11.0	0.9		145	7.10	77	0.080	0.400	0.110	0.006

K VALUE KNOWN TO BE
LESS THAN INDICATED

ATAD JADIEMAH DNA CHEMICAL
D XIDNEPPA

STORET RETRIEVAL DATE 75/01/27

210201
36 32 23.0 085 26 49.0
DALE HOLLOW RESERVOIR
21 KENTUCKY

11EPALES
3

2111202
0104 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/05/18	09 50	0000	0.010	0.7
	09 50	0006	0.009	
	09 50	0015	0.009	
	09 50	0035	0.012	
	09 50	0050	0.010	
	09 50	0075	0.006	
	09 50	0100	0.008	
73/08/18	13 50	0000	0.012	3.3
	13 50	0005	0.018	
	13 50	0025	0.014	
	13 50	0040	0.011	
	13 50	0055	0.012	
	13 50	0070	0.011	
	13 50	0085	0.018	
	13 50	0100	0.011	
	13 50	0112	0.015	
73/10/24	19 25	0000	0.007	1.5
	19 25	0010	0.009	
	19 25	0035	0.008	
	19 25	0045	0.008	
	19 25	0050	0.007	
	19 25	0080	0.008	
	19 25	0111	0.012	

STORET RETRIEVAL DATE 75/01/27

210202
36 33 42.0 085 23 04.0
DALE HOLLOW RESERVOIR
21 KENTUCKY

11EPALES
3

2111202
0122 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/05/18	13 50	0000	18.3		369	196	7.90	62	0.040	0.200	0.240	0.002K
	13 50	0006	18.3	8.7		181	8.00	62	0.020	0.200	0.240	0.003
	13 50	0015	18.1	9.8		181	8.00	62	0.020	0.200	0.250	0.009
	13 50	0040	14.8	10.0		180	8.00	61	0.030	0.200	0.280	0.002K
	13 50	0065	12.1	9.0		198	7.90	60	0.030	0.200	0.310	0.002K
	13 50	0090	11.2	9.0		192	7.70	60	0.030	0.300	0.310	0.002
	13 50	0118	10.1	7.5		198	7.70	64	0.050	0.200	0.300	0.002
73/08/18	14 40	0000	29.1		226	186	7.30	62	0.060	0.400	0.140	0.006
	14 40	0005	28.4			184	7.30	62	0.070	0.200	0.200	0.009
	14 40	0025	27.5	8.0		183	6.90	62	0.050	0.200	0.190	0.006
	14 40	0040	20.9	7.8		152	6.50	58	0.050	0.200	0.260	0.005
	14 40	0055	17.6	5.0		130	6.30	52	0.050	0.300	0.270	0.005
	14 40	0070	15.5	2.2		124	6.20	58	0.050	0.200	0.340	0.010
	14 40	0086	12.7	2.0		131	6.30	71	0.070	0.200	0.410	0.016
73/10/24	13 50	0000	21.8		228	163	7.60	55	0.050	0.200	0.070	0.006
	13 50	0010	21.7	7.4		162	7.60	53	0.040	0.200K	0.060	0.003
	13 50	0035	21.5	7.0		163	7.60	52	0.040	0.200K	0.060	0.004
	13 50	0045	21.1	4.8		153	7.20	53	0.040	0.200K	0.120	0.004
	13 50	0055	18.4	0.8		147	7.10	50	0.030	0.200K	0.310	0.004
	13 50	0080	14.7	0.8		150	7.10	61	0.180	0.200	0.030	0.005
	13 50	0111	11.2	0.8		152	7.10	80	0.300	0.400	0.040	0.008

K VALUE KNOWN TO BE LESS THAN INDICATED

13

STORET RETRIEVAL DATE 75/01/27

210202
36 33 42.0 085 23 04.0
DALE HOLLOW RESERVOIR
21 KENTUCKY

11EPALES 2111202
3 0122 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/05/18	13 50	0000	0.009	0.6
	13 50	0006	0.010	
	13 50	0015	0.009	
	13 50	0040	0.008	
	13 50	0065	0.011	
	13 50	0090	0.048	
	13 50	0118	0.011	
73/08/18	14 40	0000	0.009	2.5
	14 40	0005	0.010	
	14 40	0025	0.009	
	14 40	0040	0.009	
	14 40	0055	0.009	
	14 40	0070	0.013	
	14 40	0086	0.020	
73/10/24	13 50	0000	0.005	1.4
	13 50	0010	0.005	
	13 50	0035	0.005	
	13 50	0045	0.005	
	13 50	0055	0.006	
	13 50	0080	0.008	
	13 50	0111	0.013	

STORET RETRIEVAL DATE 75/01/27

210203
36 36 55.0 085 17 57.0
DALE HOLLOW RESERVOIR
21 KENTUCKY

11EPALES
3

2111202
0102 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/05/18	14 45	0000	18.3		288	181	8.00	60	0.030	0.200	0.280	0.003
	14 45	0006	18.2	9.4		180	8.00	59	0.020	0.200K	0.280	0.008
	14 45	0015	18.0	9.6		179	8.00	59	0.020	0.200K	0.280	0.005
	14 45	0035	15.8	9.1		181	7.90	56	0.030	0.200K	0.270	0.002
	14 45	0055	12.6	8.6		182	7.80	56	0.030	0.200K	0.320	0.002
	14 45	0075	11.9	8.4		181	7.70	61	0.040	0.200K	0.340	0.003
	14 45	0098	11.0	7.8		190	7.70	63	0.030	0.200	0.320	0.004
73/08/18	15 30	0000	29.3		144	189	7.30	59	0.100	0.400	0.230	0.011
	15 30	0005	28.5	8.2		186	7.20	59	0.060	0.300	0.150	0.007
	15 30	0025	27.0	6.0		193	6.70	63	0.050	0.400	0.180	0.005
	15 30	0040	20.3	2.6		167	6.50	64	0.100	0.300	0.460	0.004
	15 30	0055	17.4	1.8		148	6.30	62	0.050	0.400	0.380	0.004
	15 30	0070	14.9	0.8		160	6.20	83	0.160	0.400	0.300	0.003
	15 30	0085	13.1	0.2		163	6.20	89	0.240	0.600	0.060	0.006
	15 30	0095	12.3	0.8		150	6.20	85	0.270	0.600	0.130	0.012
73/10/24	12 58	0000	21.4		156	167	7.50	61	0.050	0.300	0.060	0.007
	12 58	0010	21.3	7.0		167	7.50	59	0.040	0.200K	0.050	0.004
	12 58	0030	21.3	6.8		168	7.40	60	0.040	0.200K	0.040	0.004
	12 58	0045	21.0	6.0		170	7.20	60	0.060	0.200K	0.040	0.006
	12 58	0060	17.7	0.6		172	7.00	79	0.360	0.400	0.020	0.007
	12 58	0089	13.5	0.6		173	7.00	86	0.740	0.900	0.030	0.006

K VALUE KNOWN TO BE LESS THAN INDICATED

STORET RETRIEVAL DATE 75/01/27

210204
36 37 40.0 085 12 58.0
DALE HOLLOW RESERVOIR
21 KENTUCKY

11EPALES
3

2111202
0060 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/05/19	10 00	0000	18.9		180	200	8.00	81	0.040	0.400	0.310	0.002
	10 00	0006	18.8	9.4		190	8.10	76	0.030	0.300	0.310	0.003
	10 00	0015	18.7	8.2		210	7.90	75	0.030	0.300	0.310	0.004
	10 00	0025	17.6	8.0		220	7.80	84	0.060	0.300	0.340	0.008
	10 00	0042	14.0	5.4		220	7.60	85	0.050	0.300	0.360	0.003
	10 00	0056	12.8	4.8		210	7.50	81	0.040	0.300	0.380	0.003
73/08/18	16 00	0000	29.6		108	190	7.80	67	0.070	0.600	0.060	0.005
	16 00	0005	28.6	9.2		186	7.80	66	0.030	0.500	0.040	0.005
	16 00	0020	28.1	7.6		190	7.40	67	0.040	0.500	0.060	0.004
	16 00	0035	22.1	0.7		197	6.70	90	0.050	0.400	0.400	0.004
	16 00	0050	18.6	0.5		188	7.10	97	0.250	0.700	0.130	0.003
73/10/24	10 58	0000	20.9		88	176	7.60	68	0.060	0.300	0.040	0.008
	10 58	0010	20.8	7.4		177	7.60	67	0.050	0.200K	0.020	0.005
	10 58	0022	20.7	7.0		176	7.60	67	0.050	0.200K	0.030	0.004
	10 58	0035	20.2	6.3		187	7.60	73	0.060	0.200K	0.020	0.004
	10 58	0044	19.2	5.8		195	7.50	81	0.070	0.200	0.020	0.006

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/05/19	10 00	0000	0.012	1.2
	10 00	0006	0.016	
	10 00	0015	0.017	
	10 00	0025	0.014	
	10 00	0042	0.012	
	10 00	0056	0.016	
73/08/18	16 00	0000	0.011	9.1
	16 00	0005	0.017	
	16 00	0020	0.015	
	16 00	0035	0.017	
	16 00	0050	0.030	
73/10/24	10 58	0000	0.009	2.1
	10 58	0010	0.010	
	10 58	0022	0.008	
	10 58	0035	0.015	
	10 58	0044	0.022	

K VALUE KNOWN TO BE
LESS THAN INDICATED

34

STORET RETRIEVAL DATE 73/01/27

210203
36 36 55.0 085 17 57.0
DALE HOLLOW RESERVOIR
21 KENTUCKY

11EPALES 2111202
3 0102 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/05/18	14 45	0000	0.008	0.8
	14 45	0006	0.010	
	14 45	0015	0.012	
	14 45	0035	0.010	
	14 45	0055	0.009	
	14 45	0075	0.011	
	14 45	0098	0.030	
73/08/18	15 30	0000	0.010	2.6
	15 30	0005	0.010	
	15 30	0025	0.010	
	15 30	0040	0.011	
	15 30	0055	0.009	
	15 30	0070	0.011	
	15 30	0085	0.015	
	15 30	0095	0.013	
73/10/24	12 58	0000	0.008	0.9
	12 58	0010	0.004	
	12 58	0030	0.004	
	12 58	0045	0.005	
	12 58	0060	0.007	
	12 58	0089	0.009	

STORET RETRIEVAL DATE 75/01/27

210205
36 31 08.0 085 11 58.0
DALE HOLLOW RESERVOIR
21 KENTUCKY

11EPALES
3

2111202
0075 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/05/19	13 00	0000	18.7		180	180	7.80	47	0.040	0.400	0.260	0.002
	13 00	0006	18.5	9.2		180	8.00	46	0.020	0.300	0.230	0.002K
	13 00	0015	18.4	8.6		160	7.60	44	0.020	0.300	0.230	0.002K
	13 00	0035	15.2	8.6		150	7.60	39	0.050	0.300	0.220	0.002K
	13 00	0050	13.3	8.0		180	7.50	62	0.040	0.300	0.310	0.002K
	13 00	0071	12.3	7.8		180	7.50	64	0.040	0.300	0.310	0.002K
73/08/18	18 00	0000	29.4		86	185	7.70	66	0.060	0.700	0.120	0.010
	18 00	0005	29.3	8.6		183	7.50	64	0.040	0.400	0.090	0.007
	18 00	0020	27.8	7.0		182	6.80	68	0.070	0.600	0.220	0.010
	18 00	0030	24.1	4.8		190	6.50	63	0.050	0.400	0.310	0.007
	18 00	0045	18.8	3.0		148	6.50	66	0.040	0.400	0.310	0.007
73/10/24	10 25	0000	20.9		84	172	7.50	64	0.070	0.200	0.050	0.003
	10 25	0010	20.9	7.0		171	7.50	65	0.060	0.200K	0.050	0.005
	10 25	0020	20.9	7.0		172	7.40	64	0.070	0.200K	0.040	0.004
	10 25	0050	20.4	5.2		186	7.20	66	0.100	0.200	0.050	0.006
	10 25	0062	17.7	1.4		194	7.10	86	0.580	0.800	0.020	0.010

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/05/19	13 00	0000	0.009	5.9
	13 00	0006	0.007	
	13 00	0015	0.007	
	13 00	0035	0.017	
	13 00	0050	0.007	
	13 00	0071	0.006	
73/08/18	18 00	0000	0.013	7.7
	18 00	0005	0.013	
	18 00	0020	0.016	
	18 00	0030	0.016	
	18 00	0045	0.019	
73/10/24	10 25	0000	0.006	0.6
	10 25	0010	0.005	
	10 25	0020	0.005	
	10 25	0050	0.012	
	10 25	0062	0.013	

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/01/27

210206
36 27 02.0 085 07 05.0
DALE HOLLOW RESERVOIR
21 KENTUCKY

11EPALES
4

2111202
0044 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/05/19	13	50 0000	18.8		60	175	7.70	48	0.050	0.300	0.190	0.002K
	13	50 0006	18.2	9.6		170	7.80	47	0.040	0.200	0.190	0.002K
	13	50 0015	16.1	9.4		180	7.70	37	0.050	0.200K	0.210	0.002K
	13	50 0025	15.2	9.4		190	7.60	36	0.050	0.200K	0.220	0.002K
	13	50 0040	14.9	9.2		180	7.70	80	0.050	0.200	0.320	0.002
73/08/18	18	25 0000	29.7		42	188	7.50	68	0.070	0.400	0.070	0.003
	18	25 0005	28.2	8.8		186	7.40	67	0.050	0.400	0.050	0.012
	18	25 0015	27.1	4.6		204	6.90	72	0.080	0.300	0.080	0.006
	18	25 0035	22.2	1.3		270	7.50	76	0.280	0.500	0.180	0.011
73/10/24	10	05 0000	18.8		65	204	7.50	67	0.120	0.400	0.090	0.009
	10	05 0005	18.8	8.0		206	7.50	64	0.100	0.200K	0.070	0.003
	10	05 0015	18.0	7.0		290	7.40	81	0.100	0.200K	0.180	0.005
	10	05 0027	17.6	7.0		256	7.50	98	0.100	0.200K	0.100	0.004

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/05/19	13	50 0000	0.010	8.4
	13	50 0006	0.009	
	13	50 0015	0.005	
	13	50 0025	0.006	
	13	50 0040	0.010	
73/08/18	18	25 0000	0.016	13.2
	18	25 0005	0.015	
	18	25 0015	0.016	
	18	25 0035	0.022	
73/10/24	10	05 0000	0.019	2.2
	10	05 0005	0.010	
	10	05 0015	0.009	
	10	05 0027	0.013	

K VALUE KNOWN TO BE
LESS THAN INDICATED

APPENDIX E

TRIBUTARY and WASTEWATER TREATMENT PLANT DATA

STORET RETRIEVAL DATE 75/01/13

2102A1 LS2102A1
36 38 00.0 085 08 30.0
SPRING CREEK
21199 7.5 ALBANY,KY-TN
T/DALE HOLLOW RESVR
BRDG ON RD .5 MI NW LOCUST GROVE SCHOOL
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/04/01	10 00		0.700	0.130	0.020	0.012	0.050
73/04/29	10 20		0.470	0.175	0.010	0.005K	0.045
73/06/17	10 20		0.880	0.500	0.033	0.018	0.055
73/07/22	10 05		0.640	0.840	0.029	0.273	0.400
73/08/19	09 45		0.630	2.310	0.072	0.300	0.345
73/09/16	08 30		0.590	0.560	0.093	0.350	0.380
73/10/14	09 30		0.378	0.300	0.005K	0.378	0.420
73/11/18	16 40		0.588	0.575	0.016	0.240	0.275
74/01/05	16 00		1.120	0.300	0.030	0.005	0.060
74/01/20	10 20		1.040	0.100K	0.010	0.025	0.025
74/02/02	10 45		0.770	2.000	0.125	0.010	
74/02/17	10 30		0.770	0.500	0.070	0.015	0.035
74/03/17	10 25		0.680	0.600	0.030	0.032	0.040

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K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/01/13

2102B1 LS2102B1
36 39 00.0 085 12 00.0
SULPHUR CREEK
21 7.5 ALBANY,KY-TN
T/DALE HOLLOW RESVR
.4 FROM END RD 1MI E OF ST RT 55
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/04/01	10 00		0.440	0.170	0.033	0.005K	0.015
73/04/29	09 55		0.380	0.100K	0.019	0.005K	0.015
73/06/17	09 40		0.710	0.250	0.010	0.006	0.020
73/07/22	09 40		0.700	0.170	0.012	0.010	0.015
73/08/19	09 15		0.480	0.230	0.058	0.007	0.015
73/09/16	08 50		0.180	0.115	0.027	0.013	0.015
73/10/14	09 10		0.038	0.450	0.015	0.011	0.025
73/11/18	10 00		0.120	0.600	0.024	0.008	0.035
74/01/05	15 30		0.780	0.200	0.010	0.005	0.010
74/01/20	09 56		0.600	0.100K	0.005K	0.005	0.005K
74/02/02	10 00		0.430	0.900	0.170	0.020	
74/02/17	09 00		0.480	0.800	0.055	0.005K	0.010
74/03/17	09 55		0.430	1.600	0.095	0.005K	0.005K

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/01/13

2102C1 LS2102C1
36 42 30.0 085 14 00.0
ILLWILL CREEK
21 7.5 ALBANY,KY-TN
T/DALE HOLLOW RESVR
JUST ABOVE HOGBACK CREEK
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/04/01	12 00		0.370	0.230	0.064	0.005K	0.010
73/06/17	08 20		0.900	0.290	0.009	0.005K	0.010
73/07/22	08 27		0.310	0.230	0.013	0.005K	0.005K
73/08/19	08 15		0.300	4.500	0.069	0.005K	0.015
73/09/16	09 30		0.300	1.150	0.230	0.005K	0.015
73/10/14	10 05		0.010K	0.950	0.035	0.006	0.010
73/11/18	08 45		0.016	0.500	0.032	0.005K	0.030
74/01/05	14 35		1.100	0.200	0.005	0.005	0.010
74/01/20	08 56		0.740	0.100K	0.005K	0.005K	0.005K
74/02/02	11 30		0.580	1.200	0.065		
74/02/17	08 20		0.520	0.200	0.022	0.005K	0.005
74/03/17	08 50		0.504	0.900	0.120	0.005K	0.005K

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/01/13

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 2102D1                47X2D1
36 36 00.0 085 07 00.0
WOLF RIVER
21        7.5 MOODYVILLE,K
T/DALE HOLLOW RESVR
HWY 42 BRDG;2.5 MI WSW OF ST ATIC
11EPALES                  2111204
4                         0000 FEET  DEPTH
```

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/04/14	14 00		0.270	0.370	0.010	0.008	0.010
73/05/08	12 45		0.330	0.200	0.014	0.014	0.020
73/06/01	15 00		0.357	0.650	0.023	0.005K	0.010
73/07/11	12 20		0.440	0.690	0.014	0.006	0.040
73/08/15	13 10		0.390	0.230	0.024	0.014	0.025
73/09/13	13 00		0.200	0.220	0.030	0.028	0.035
73/10/18	11 30		0.054	1.300	0.063	0.032	0.045
73/11/16	10 00		0.062	1.150	0.026	0.020	0.035
73/12/20	10 00		0.450	0.200	0.024	0.012	0.035
74/01/16	11 30		0.552	0.100K	0.012	0.008	0.010
74/02/06	12 00		0.400	0.300	0.015	0.005K	0.015
	12 15		0.320	0.100K	0.020	0.005K	0.015
74/02/20	09 30		0.360	0.200	0.015	0.010	0.010

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/01/13

2102E1 47X2E1
39 25 00.0 085 01 30.0
E FORK OBEY RIVER
21 7.2 RIVERTON TN
T/DALE HOLLOW RESVR
HWY 52 BRDG; 6 MI W OF JAMESTOWN
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/04/14	11 30		0.160	1.200	0.056	0.007	0.015
73/05/08	11 00		0.138	0.220	0.023	0.009	0.010
73/06/01	14 50		0.110	0.460	0.140	0.005K	0.015
73/07/11	10 40		0.380	0.890	0.052	0.005K	0.020
73/08/15	11 00		0.290	0.100K	0.019	0.005K	0.015
73/09/13	10 30		1.120	0.100K	0.015	0.005K	0.005K
73/10/18	13 30		1.300	1.150	0.260	0.007	0.010
73/11/16	12 00		0.740	0.850	0.056	0.005K	0.030
73/12/20	12 30		0.192	0.100K	0.040	0.012	0.012
74/01/16	13 30		0.216	0.200	0.036	0.005K	0.015
74/02/06	10 45		0.148	0.100K	0.020	0.005K	0.005
74/02/20	13 00		0.232	0.100K	0.030	0.005K	0.020

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/01/13

2102F1 47X2F1
36 25 00.0 085 04 30.0
BIG INDIAN CREEK
21 7.5 RIVERTON TN
T/DALE HOLLOW RESVR
HWY 52 BRDG;3 MI W OF STATION E1
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/04/14	11 00		0.082	0.100K	0.005K	0.005K	0.005K
73/05/08	10 45		0.154	0.130	0.005K	0.011	0.015
73/06/01	14 35		0.200	0.880	0.011	0.005K	0.005K
73/07/11	10 20		0.220	0.930	0.037	0.005K	0.015
73/08/15	10 45		0.290	0.120	0.019	0.005K	0.005K
73/09/13	10 15		0.180	0.100K	0.013		0.005
73/10/18	14 00		0.176	1.200	0.152	0.008	0.008
73/11/16	12 30		0.189	1.050	0.038	0.009	0.009
73/12/20	12 15		0.336	0.400	0.008	0.012	0.035
74/01/16	13 45		0.232	0.100K	0.005K	0.005K	0.005
74/02/06	10 30		0.252	0.100K	0.005	0.005K	0.010
74/02/20	13 30		0.270	0.200	0.010	0.005	0.030

LESS THAN INDICATED
K VALUE KNOWN TO BE

STORET RETRIEVAL DATE 75/01/13

2102G1 47X2G1
36 26 00.0 085 01 00.0
POPULAR COVE CREEK
21 7.5 RIVERTON TN
T/DALE HOLLOW RESVR
LIGHT RD BRDG .3 MI E OF HELENA CHURCH
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/04/14	11 40		0.320	0.920	0.012	0.005K	0.005K
73/05/08	11 15		0.410	0.100K	0.008	0.005K	0.005K
73/06/01	15 10		0.440	2.200	0.017	0.008	0.015
73/07/11	10 55		0.430	1.980	0.058	0.006	0.025
73/08/15	11 05		0.530	0.100K	0.017	0.005K	0.010
73/09/13			0.510	0.100K	0.007	0.007	0.007
73/10/18	13 00		0.500	1.450	0.066	0.008	0.008
73/11/16	11 30		0.310	0.950	0.025	0.008	0.015
73/12/20	12 45		0.880	0.400	0.012	0.012	0.015
74/01/16	13 00		0.510	0.100	0.008	0.016	0.020
74/02/06	11 00		0.450	0.100K	0.005	0.005K	0.005K
74/02/20	12 30		0.450	0.300	0.010	0.005K	0.007

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/01/13

2102H1 47X2H1
36 24 00.0 085 10 30.0
W FORK OBEY RIVER
21 7.5 ALPINE TN
T/DALE HOLLOW RESVR
LIGHT RD BRDG;N OF HWY 52 BRDG 0.5 MI
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/04/14	10 40		0.132	0.100K	0.005K	0.005K	0.010
73/05/08	10 15		0.190	0.230	0.005K	0.008	0.020
73/06/01	14 10		0.189	1.400	0.030	0.005K	0.040
73/07/11			0.210	1.200	0.126	0.005K	0.010
73/08/15	10 15		0.260	0.100K	0.016	0.005K	0.005K
73/09/13	10 00		0.160	0.100K	0.010	0.005K	0.005K
73/10/18	14 30		0.100	2.000	0.150	0.007	0.010
73/11/16	13 00		0.138	0.300	0.015	0.007	0.007
73/12/20	11 45		0.390	0.200	0.008	0.005K	0.025
74/01/16	14 15		0.224	0.100	0.008	0.005K	0.015
74/02/06	10 10		0.200	0.300	0.045	0.005K	0.005
	10 15		0.168	0.100K	0.025	0.005	0.015
74/02/20	13 45		0.176	0.100K	0.010	0.005K	0.005K

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/01/13

2102J1 47X2J1
36 28 30.0 085 14 30.0
BIG EAGLE CREEK
21 7.5 ALPINE TN
T/DALE HOLLOW RESVR
LIGHT RD BRDG 10 MI NNE OF LIVINGSTON
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/04/14	14 30		0.336	1.210	0.012	0.005K	0.005K
73/05/08	13 50		0.470	0.270	0.010	0.020	0.030
73/06/01	15 45		0.530	0.820	0.019	0.008	0.015
73/07/11	13 00		0.840	2.100	0.060	0.005K	0.015
73/08/15	13 45		0.500	0.190	0.018	0.008	0.010
73/09/13	14 00		0.370	0.170	0.008	0.006	0.010
73/10/18	10 30		0.399	1.400	0.076	0.008	0.008
73/11/16	09 30		0.240	1.450	0.092	0.009	0.015
73/12/20	11 00		0.660	0.700	0.044	0.020	
74/01/16	11 00		0.588	0.100K	0.008	0.008	0.020
74/02/06	11 15		0.400	0.300	0.030	0.010	0.035
	12 40		0.504	0.100	0.015	0.015	
74/02/20	09 00		0.490	0.200	0.015	0.005K	0.010

K VALUE KNOWN TO BE
LESS THAN INDICATED

47

STORET RETRIEVAL DATE 75/01/13

2102K1 47X2K1
36 32 30.0 085 27 30.0
OBEY RIVER
21 7.5 DALE HOLLOW
O/DALE HOLLOW RESVR
BANK BELO DAM APPROX 3 MI E OF CELINA
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/31	13 25		0.154	0.230	0.036	0.005K	0.005K
73/04/29	10 30		0.189	0.360	0.130	0.005K	0.015
73/07/22	13 00		0.310	2.600	0.071	0.009	0.010
73/08/19	10 15		0.270	0.520	0.078	0.008	0.010
73/09/03	14 30		0.220	0.330	0.048	0.005K	0.005K
73/10/15	12 00		0.220	2.200	0.132	0.005K	0.005K
73/11/18	09 30		4.800	0.100K	0.044	0.008	0.015
73/12/09	09 30		4.850	0.100K	0.024		0.010
74/01/06	09 45		0.144	0.100	0.055	0.005K	0.010
74/02/17	09 45		0.184	1.400	0.085	0.005	0.015
74/03/17	09 45		1.180	0.500	0.025	0.005K	0.005K

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/02/03

2102AA AS2102AA P002500*
36 41 00.0 085 08 00.0
ALBANY
21199 7.5 ALBANY
T/DALE HOLLOW RES
CEDAR FORK BRANCH/SPRING CREEK
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/05/01	09 00		0.170	47.000	13.200	16.000	22.000	0.300	0.300
73/06/01	08 30		0.360	33.600	3.500	1.680	24.000	0.350	0.333
73/07/03	12 00		0.290	26.000	8.000	8.800	25.000	0.350	0.350
73/08/01	09 00		0.180	44.000	11.600	13.200	13.600	0.370	0.350
73/09/04	08 30							0.400	0.400
73/09/29	09 30		0.060	56.000	10.800	21.000	27.000	0.400	0.400
73/11/06	10 20		0.040	36.000	14.000	14.500	26.000	0.350	0.350
73/12/04	13 00			36.000			18.800	0.250	0.300
74/01/02	08 30		0.200	17.000	1.600	15.000	24.000	0.300	0.350
74/01/30	12 00		0.520	31.000	7.400	14.400	22.000	0.300	0.350
74/04/02	13 00		0.160	21.000	5.700	7.800	14.500	0.300	0.300
74/04/30	22 00		0.280	76.000	15.000	40.000	55.000	0.350	0.350
74/05/30	09 30		0.595	33.000	6.700	17.000	25.000	0.350	0.350

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